

Appl. No. 10/631,049
Amdt. dated December 7, 2004
Reply to Office Action of November 26, 2004

Amendments to the Claims

1. (*Original*) Apparatus (20; 30; 41) for performing a temperature measurement function, comprising a first stage with
 - a first circuit (11) and a second circuit (12) being arranged in parallel,
 - said first circuit (11) comprising a first transistor (M1) , a first resistor (R_{temp}) , and a parallel arrangement of n diodes ($B1 - Bn$),
 - said second circuit (12) comprising a second transistor (M2) and a parallel arrangement of m diodes (C2),
 - an operational amplifier (13) on the input side being connected to the first circuit (11) and the second circuit (12), said operational amplifier (13) applying a gate voltage to said first transistor (M1) and said second transistor (M2),
 - said apparatus (20; 30; 41) further comprising an output stage with p output transistors ($N1 - Np$), and an output resistor ($r \cdot R_{temp}$) performing a current to output voltage conversion in order to provide an output voltage ($V_{tempout}$) that depends on the actual temperature (T).
2. (*Original*) The Apparatus (20; 30; 41) of claim 1, wherein said first transistor (Mi) provides a first current (I1) flowing through the parallel arrangement of n diodes ($Bi - Bn$) and said second transistor (M2) provides a second current (I2) flowing through the parallel arrangement of m diodes (C2).
3. (*Previously Presented*) The Apparatus (20; 30; 41) of claim 1 , wherein said operational amplifier (13) has a first input (15), a second input (14), and an output (16), the first input (15) being connected to a drain of the first transistor (M1) and the second input (14) being connected to a drain of the second transistor (M2), said output (16) being connected to a gate of said first transistor (M1) and a gate of said second transistor (M2) for biasing these transistors (M1, M2).
4. (*Currently Amended*) The Apparatus (20; 30; 41) of claim 1, wherein said output stage amplifies ~~said first~~ a first current (I1) to obtain a third current (I3) before performing said

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current to output voltage conversion by converting said third current (13) into said output voltage ($V_{tempout}$)

5. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1 wherein said first resistor (R_{temp}) and said output resistor ($r \cdot R_{temp}$) are both either integrated Npoly resistors or integrated Ppoly resistors.

6. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1, wherein said output resistor (R_{temp}) is realized by a plurality of r resistors, the resistance of the output resistor ($r \cdot R_{temp}$) being r times the resistance of said first resistor (R_{temp}), r being an integer number.

7. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1, comprising a hold-capacitor (C) being arranged in parallel to the output resistor ($r \cdot R_{temp}$) in order to filter out noise and/or to stabilize said output voltage ($V_{tempout}$)

8. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1, wherein said first transistor (M1) and said output transistors (N1 – Np), as well as said first resistor (R_{temp}) and output resistor ($r \cdot R_{temp}$) are designed to minimize mismatch effects.

9. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1, wherein said number n , m and p are integer numbers.

10. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1, wherein diode-connected PNP bipolar transistors (B1 – Bn, C2) serve as diodes.

11. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1, wherein said operational amplifier (13) is a low-offset operational amplifier.

12. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1, wherein the output voltage $V_{tempout}$ and the actual temperature (T) have a linear dependency.

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13. *(Previously Presented)* The Apparatus (20; 30; 41) of claim 1, wherein the gate voltage is applied to gates of the p output transistors (N_i - N_p).
14. *(Previously Presented)* The Apparatus (30) of claim 1 further comprising a temperature compensation network (31) providing a bandgap reference voltage (V_{bgp}) at another output (36).
15. *(Original)* The Apparatus (30) of claim 14, wherein the temperature compensation network (31) comprises a plurality of voltage followers (32, 33, 34) with an implemented offset, the voltage followers (32, 33, 34) being connected in series.
16. *(Currently Amended)* Device (40) ~~comprising~~ including an apparatus (41) according to claim 1.
17. *(Original)* The device (40) of claim 16, further comprising an analog-to-digital converter (42).
18. *(Currently Amended)* The device (40) of claim 16 being part of a circuit, the circuit including at least one of the following: an analog device, a mixed-mode device, or a digital device.